

DUCTED FUEL INJECTION FOR SOOT REDUCTION

US Pat. No. 9,909,549, additional patents pending

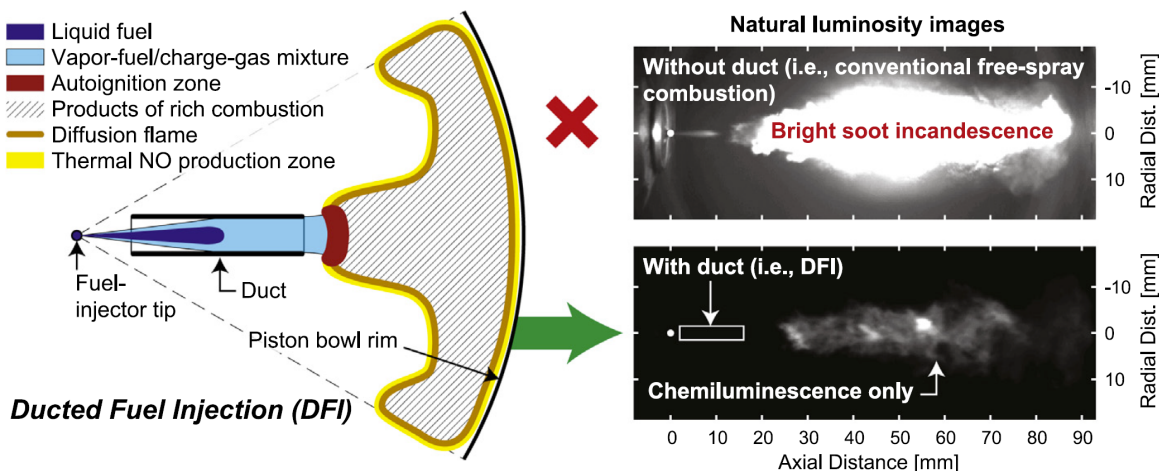
Technology Readiness Level: 3

Key elements demonstrated in a laboratory environment

Sandia National Laboratories has developed ducted fuel injection technology for the reduction of soot and other EPA regulated emissions in direct-injection engines. Typical direct-injection engines, such as diesel engines, can produce soot due to fuel-rich combustion conditions. Filters and catalytic converters are currently used to reduce soot and harmful emissions, but these systems are expensive, large, complex, and they penalize engine efficiency. Sandia's ducted fuel injection technology reduces soot at the point of combustion, thereby reducing the need for these after-treatment devices and their associated costs.

Sandia's mechanical solution forces each fuel spray from the fuel injector through a small duct located within the combustion chamber. Oxygen is drawn into each duct due to the pressure field established during fuel injection, and the ensuing enhanced turbulent mixing creates an optimized mixture of fuel and oxygen. The more-homogeneous fuel mixture is then released from the duct into the combustion chamber where it ignites—eliminating soot that results from unevenly mixed, fuel-rich combustion.

Sandia's ducted fuel injection technology could be a key technology for future engines because it is an effective, conceptually simple approach for lowering soot and other emissions, as well as potentially improving combustion efficiency. It also has potential applications in spark ignition engines, gas turbine engines, industrial boilers, and refinery flaring.



TECHNICAL BENEFITS

- Decreases emissions and potentially other harmful emissions
- Reduces engine system costs
- Increases engine efficiency
- Tolerant to a wide variety of fuels

INDUSTRIES & APPLICATIONS

- Diesel (compression ignition) engines
- Spark ignition engines
- Gas turbine engines
- Industrial burners/boilers
- Wellhead/refinery flaring

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